

# User- and expert-provided Data Products for PACS spectrometer

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*Exploiting the Herschel Science Archive*



# Outline



1. Standard Processing Generation for PACS Spectrometer
2. User Provided Data Products (UPDPs)
3. PACS Spectrometer Highly Processed Data Products (HPDPs)
4. PACS Spectrometer Ancillary Data Products (ADPs)



# User Provided Data Products (SPG)



- To date, 4 Key Projects/consortia holders of PACS Spectrometer data have provided products corresponding to 329 obsids:
  - **KINGFISH**: Key Insights on Nearby Galaxies: a Far Infrared Survey with Herschel (KPOT rkennicu\_1, SDP rkennicu\_3)
  - **DIGIT**: Dust, Ice, and Gas in Time (KPOT nevans\_1, SDP nevans\_3)
  - **FOOSH**: FU Orionis Objects Surveyed with Herschel (OTI jgreen02\_2)
  - **VNGS**: Physical Processes in the Interstellar Medium of Very Nearby Galaxies (KPGT\_cwilson01\_1)
  
- Product data formats are either:
  - Spectra
  - Cubes
  
- UPDPs can be downloaded:
  - as a whole .tar ball, via the HSA User Interface or the repository at <http://www.cosmos.esa.int/web/herschel/user-provided-data-products>
  - an obsid per obsid basis via the HSA User Interface



# Highly Processed Data Product Provision



- The Herschel Science Archive should eventually serve the following PACS Spectrometer Highly-Processed Data Products:
  - Red-leak observations (for line emission at wavelengths  $>190$   $\mu\text{m}$ )
  - Pointing Offset Corrected spectra for a subset of single-pointed observations
  - Blue (non-flux calibrated) spectra for line inspection
  - Unchopped observations with continuum removed
  - Non-standard AOTs processed with SPG infrastructure.
  - Isolated observations not processable by the standard pipeline, and that will be generated with ad-hoc processing by instrument experts



# Highly Processed Data Product Provision

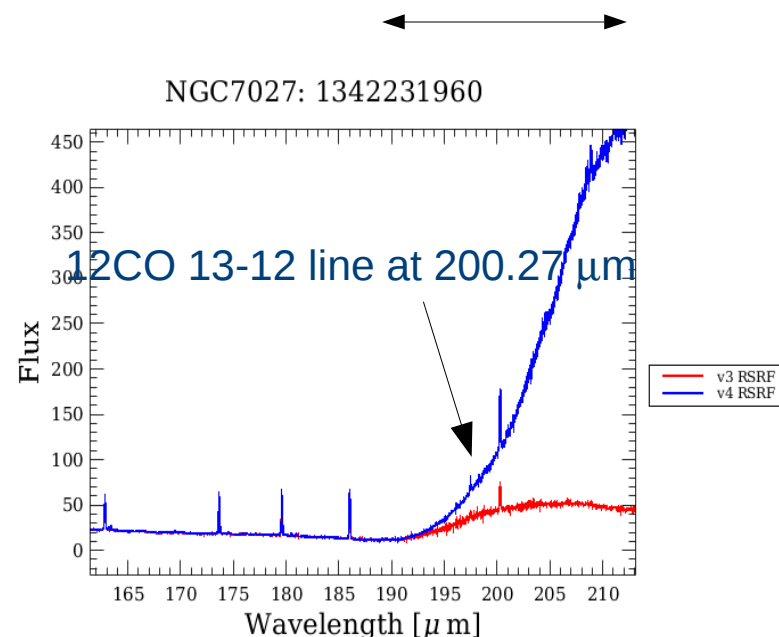
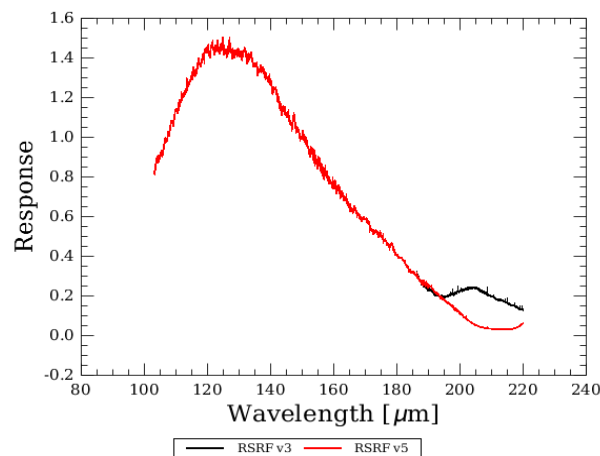


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# Red-leak products

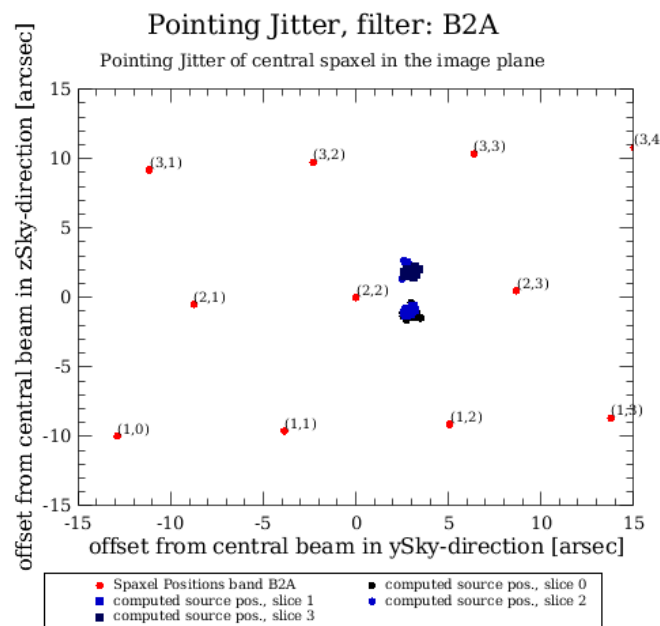
- Level 2 products longward of 190  $\mu\text{m}$ , suffering from order 2 leak in R1 band. Leaks: Order superimposition due to finite steepness of the sorting order filters (dichroics) edges.
- Documented in Sec. 4.1 of the PACS Spectrometer Calibration Document
- V5 RSRF in HIPE 14.2 (calibration file version 77) enables calibration **for the order 1 line fluxes** within the leaked spectral range (continuum is still uncalibrated)
- Requires an alternative absolute flux calibration scheme (using calibration block +v5RsrF1) for chopNod observations.





# Pointing offset correction

- Mitigates flux loss of point source spectra due to pointing offsets/jitter, calculating a correction to the telescope pointing by comparing the flux distribution to the telescope beams.
- Script calculating a median offset per nod (i.e. per slice), applicable to sources even fainter than 40 Jy
- Applied to chopNod, single-pointing, range scans and SEDs



# Ancillary Data Product Provision



- The Herschel Science Archive should eventually serve the following PACS Spectrometer Ancillary Data Products:
  - PACS Spectrometer beam efficiencies
  - SEU monitoring
  - Trend Analysis Data Products





# PACS Spectrometer beam efficiencies

- Produced on Neptune raster maps
- Beam efficiencies are provided for each of the 25 PACS modules at 14 wavelengths (1 in B3A, 3 in B2A, 4 in B2B and 7 in R1).
- contains 375 FITS files.

